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EXAMINER	
LEE, JOHN W	

ART UNIT	PAPER NUMBER
2624	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/25/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/633,815	WRIGGLESWORTH ET AL.	
	Examiner	Art Unit	
	John Wahnkyo Lee	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Amendment filed on February 22, 2007 has been entered in full.

2. Applicant's amendments to claim objections have been fully entered and are persuasive. The claim objections have been withdrawn.

Response to Arguments

4. Applicant's arguments regarding the objection to the specification has been fully considered but they are not persuasive.

As provided in 37 CFR 1.77(b), each of the lettered items of the section of the specification of a utility application should appear in upper case, without underlining or bold type, as a section heading. However, each of the lettered items of the title of each section of the applicant's specification is not all in upper case.

5. Applicant's arguments regarding claim rejections under 35 U.S.C. § 101 filed on February 22, 2007 have been fully considered but they are not persuasive.

6. Claims 31 and 32 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 31 and 32 are drawn to functional descriptive material NOT claimed as residing on a computer readable medium. MPEP 2106.IV.B.1(a) (Functional Descriptive Material) states:

"Data structures not claimed as embodied in a computer-readable medium are descriptive material per se and are not statutory because they are not capable of causing functional change in the computer."

"Such claimed data structures do not define any structural or functional interrelationships between the data structure and other claimed aspects of the invention which permit the data structure's functionality to be realized."

Claims 31 and 32, while defining a "storage medium", does not define a "computer-readable medium" and is thus non-statutory for that reasons. A "storage medium" can range from paper on which the program is written, to a program simply contemplated and memorized by a person. Moreover, the applicant does not explicitly disclose on the specification that can correspond to a "storage medium", and the "storage medium" cannot encompass the combination of software and hardware elements disclosed at lines 20-25 on page 10. The examiner suggests amending the claim to embody the program on "computer-readable medium" in order to make the claim statutory.

"In contrast, a claimed computer-readable medium encoded with the data structure defines structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure's functionality to be realized, and is thus statutory." - MPEP 2106.IV.B.1(a)

7. Applicant's arguments with respect to claims 1-32 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1, 9, 21-22, 25, 27, and 31-32 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1, 21, 25, and 31 encompass that a belief functions are updated based on an "experienced" operator. The specification of the applicant does not disclose anything that reads on an "experience" operator. The applicant discloses the part, "... to an operator trained ..." at lines 3-4 on page 15 of the specification. However, can you consider an operator, who is trained for a day, as an experienced operator? It is readily apparent an operator who is trained cannot be equivalent with an experienced operator. Claims 9, 22, 27, and 25 encompass that the "second feature set comprises one of the features no included in the first feature set." The applicant discloses the fact, "a first belief function may be generated from one or more targets having a first feature set (e.g., a size feature), and a second belief function may be generated from one or more targets having a second feature set (e.g., a shape feature)", at lines 22-25 on page 13 of the specification. However, this fact does not inherent or implies that the second feature set comprises one of the features not included in the first feature set.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1, 3-4, 5-6, 9-10, 16-18, 20-22, 24-25, 27, and 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacAulay Calum et al. (WO 97/43732) in view of Reiser et al. (U.S. 6,125,339), and further in view of Berliner (2002/0001402)

Regarding claim 1, MacAulay discloses the same function of the imaging subsystems using a CCD camera (Fig 1-14 Digital High Resolution CCD Camera; page 5, lines 15-18), which captures the images of cell sample which (page 5, lines 15-16) can be considered equivalent to generating track files, and an image processing subsystem as a digital image processing unit (Fig 1-32; page 5, lines 21-28). Moreover, MacAulay discloses that the target of the system can be a tissue (page 1, lines 16-17) and a cell (abstract). A process whether the frequency of MAC-positive cells exceeds a predetermined threshold can be interpreted as a belief function (Fig 10-340; page 13, lines 1-9). The sample of cells imaged with a digital microscope having pixels is disclosed (Abstract). A radial vector containing the velocity and the angle to know the rotational movement and an equation to calculate the elongation, which has a radial vector, to track files from optical data of the image of the target is disclosed (page 18,

lines 20-28). Array elements as pixels (abstract) are disclosed and imply that each array contains a three dimension by moving the microscope in the stage z-direction in multiple focal planes around the approximate frame focus (page 3, lines 11-13). An image processing subsystem that identifies the target image files (page 5, lines 24-25) and generates feature sets such as mean radius, run length texture feature, morphological area, inertia shape, sphericity, compactness, x-centroid, and y-centroid for identification of the target (pages 14-37), which can be used to calculate the feature sets recited in the claims, is disclosed. However, MacAulay does not disclose or teach about generating a first and second probabilistic belief functions from each feature sets, belief functions being updated based on experienced operator analysis of the image with respect to the extracted features, and the probability comprising an arithmetic function of the first and second belief function. Instead of MacAulay, Reiser discloses an invention providing a method for automatically learning belief functions comprising the ability to determine erroneous information sources, inappropriate information combinations, and optimal information granularities, along with enhanced system performance (col. 2, lines 6-10). The invention can be embodied in a method of training belief functions including the steps of gathering information representative of an object or event, creating a set of basic probability assignments based on said set of information, creating combinations of said basic probability assignments, measuring an error present in said basic probability assignments and said combinations of basic probability assignments, and calculating updates of said basic probability assignments and said combinations of basic probability assignments based on said error, and

modifying said basic probability assignments and said combinations of basic probability assignments with said updates (col. 2, lines 10-22). For the probability function, a Dempster-Shafer function is used (claim 1) that is a discrete probability function widely used for constructing belief maps. However, Reiser does not disclose updating the belief function based on experience operator, but Berliner discloses a profile of the particulate components being analyzed manually by a physician or a trained technician in order to evaluate the probability of the existence of an inflammatory reaction in the sample (page 9, paragraph [0143]).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Reiser's method and Berliner's method in MacAulay's system for automatically detecting malignancy-associated changes. The motivation would have been to provide determination of an erroneous information sources, inappropriate information combinations, optimal information granularities with enhanced system performance as suggested by Reiser (col. 2, lines 6-10), and to provide an easily implementable and utilizable architecture as suggested by Berliner (page 2, paragraph [0014]).

Regarding claims 3 and 4, MacAulay further discloses the same function of the imaging subsystems using a CCD camera (Fig 1-14 Digital High Resolution CCD Camera; page 5, lines 15-18), which captures the images of cell sample that (page 5, lines 15-16) can be considered equivalent to generating track files.

Regarding claims 5 and 6, MacAulay further discloses the sample of cells imaged with a digital microscope having pixels (Abstract). A radial vector containing the velocity

and the angle to know the rotational movement and an equation to calculate the elongation, which has a radial vector, to track files from optical data of the image of the target is disclosed (page 18, lines 20-28). Array elements as pixels (abstract) are disclosed and imply that each array contains a three dimension by moving the microscope in the stage z-direction in multiple focal planes around the approximate frame focus (page 3, lines 11-13). An image processing subsystem that identifies the target image files (page 5, lines 24-25).

Regarding claims 9 and 10, MacAulay further discloses an image processing subsystem that identifies the target image files (page 5, lines 24-25) and generates feature sets such as mean radius, run length texture feature, morphological area, inertia shape, sphericity, compactness, x-centroid, and y-centroid for identification of the target (pages 14-37), which can be used to calculate the feature sets recited in the claims.

Regarding claim 16, Reiser further discloses a method of training belief functions including the steps of gathering information representative of an object or event, creating a set of basic probability assignments based on said set of information, creating combinations of said basic probability assignments (col. 2, lines 10-18).

Regarding claim 17, Reiser further discloses the supervised training process (col. 2, lines 44-46).

Regarding claim 18, Reiser further discloses the unsupervised training process (col. 2, lines 46-49).

Regarding claim 20, Reiser further discloses the feature of repeating the extracting for the revised feature sets based on belief functions results (Fig. 2; col. 4, lines 32-35).

Regarding claim 21, MacAulay discloses the same function of the imaging subsystems using a CCD camera (Fig 1-14 Digital High Resolution CCD Camera; page 5, lines 15-18) and an image processing subsystem as a digital image processing unit (Fig 1-32; page 5, lines 21-28). Moreover, MacAulay discloses that the target of the system can be a cancerous-cell, a tissue (page 1, lines 14-17), and a cell (abstract), but not the discriminating system using a probabilistic belief function. A process whether the frequency of MAC-positive cells exceeds a predetermined threshold can be interpreted as a belief function (Fig 10-340; page 13, lines 1-9). An image processing subsystem generating feature sets, which can be applied to detect the cell as a target, such as mean radius, run length texture feature, morphological area, inertia shape, sphericity, compactness, x-centroid, and y-centroid for identification of the cell (pages 14-37) is disclosed. However, MacAulay does not disclose or teach about generating a first and second probabilistic belief functions from each feature sets, belief functions being updated based on experienced operator analysis of the image with respect to the extracted features, and the probability comprising an arithmetic function of the first and second belief function. Instead of MacAulay, Reiser discloses an invention providing a method for automatically learning belief functions comprising the ability to determine erroneous information sources, inappropriate information combinations, and optimal information granularities, along with enhanced system performance (col. 2, lines 6-10).

The invention can be embodied in a method of training belief functions including the steps of gathering information representative of an object or event, creating a set of basic probability assignments based on said set of information, creating combinations of said basic probability assignments, measuring an error present in said basic probability assignments and said combinations of basic probability assignments, and calculating updates of said basic probability assignments and said combinations of basic probability assignments based on said error, and modifying said basic probability assignments and said combinations of basic probability assignments with said updates (col. 2, lines 10-22). For the probability function, a Dempster-Shafer function is used (claim 1) that is a discrete probability function widely used for constructing belief maps. However, Reiser does not disclose updating the belief function based on experience operator, but Berliner discloses a profile of the particulate components being analyzed manually by a physician or a trained technician in order to evaluate the probability of the existence of an inflammatory reaction in the sample (page 9, paragraph [0143]).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Reiser's method and Berliner's method in MacAulay's system for automatically detecting malignancy-associated changes. The motivation would have been to provide determination of an erroneous information sources, inappropriate information combinations, optimal information granularities with enhanced system performance as suggested by Reiser (col. 2, lines 6-10), and to provide an easily implementable and utilizable architecture as suggested by Berliner (page 2, paragraph [0014]).

Regarding claim 22, MacAulay further discloses an image processing subsystem generating feature sets, which can be applied to detect the cell as a target, such as mean radius, run length texture feature, morphological area, inertia shape, sphericity, compactness, x-centroid, and y-centroid for identification of the cell (pages 14-37).

Regarding claim 24, Reiser further discloses the supervised training process (col. 2, lines 44-46) and the unsupervised training process (col. 2, lines 46-49).

Regarding claim 25, claim 25 corresponds to claim 1. See claim 1 explanation.

Regarding claims 27 and 30, MacAulay discloses a process whether the frequency of MAC-positive cells exceeds a predetermined threshold can be interpreted as a belief function (Fig 10-340; page 13, lines 1-9) and an image processing subsystem generating feature sets, which can be applied to detect the cell as a target, such as mean radius, run length texture feature, morphological area, inertia shape, sphericity, compactness, x-centroid, and y-centroid for identification of the cell (pages 14-37).

Regarding claim 31, claim 31 corresponds to claim 1. See explanation of claim 1.

Regarding claim 32, claim 32 corresponds to claim 9. See explanation of claim 9.

12. Claims 2 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacAulay Calum et al. (WO 97/43732) in view of Reiser et al. (U.S. 6,125,339), and further in view of Berliner (2002/0001402) and further in view of Legorreta-Sanchez (US 3,675,768).

Regarding claim 2, MacAulay, Reiser, and Berliner discloses the previous claim limitations except the detail claim limitation of claim 2. However, Lagoretta-Sanchez discloses the emission of light when the cell has been stained with fluorescent stains and relation between the size of the cytoplasm and the size of the nucleus that differentiates an atypical cell from a normal cell (col. 3, lines 56-60). Moreover, Lagoretta-Sanchez especially discloses a step of determining the ratio of nucleus size to cytoplasm size in each cell (claim 45).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Reiser's method, Berliner's method, and Legorreta-Sanchez's method in MacAulay's system for automatically detecting malignancy-associated changes. The motivation would have been to use a study that has been recognized and well known that differentiates an atypical cell from a normal cell as suggested by Legoretta-Sanchez (col. 3, lines 45 and 52-53).

Regarding claim 26, claim 25 corresponds to claim 2. See explanation of claim 2.

13. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over MacAulay Calum et al. (WO 97/43732) in view of Reiser et al. (U.S. 6,125,339), and further in view of Berliner (2002/0001402) and further in view of Maurer et al. (2001/003375).

Regarding claim 7, MacAulay, Rieser, and Berliner disclose all the claim limitations of the previous claim limitation and the various depth of changes calculated to detect the anomalous of the cells (claim 10), that is disclosed by MacAulay. However, MacAulay and Rieser does not disclose rest of the claim limitation of claim 7, but

Maurer disclose the feature of generating three-dimension images from two-dimension images in the drawings (Fig. 17).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Reiser's method, Berliner's method, and Maurer's method in MacAulay's system for automatically detecting malignancy-associated changes. The motivation would have been to provide a vision based motion capture system that can be implemented more convenient and efficient as suggested by Maurer (page 1, paragraph [0003]).

14. Claims 8, 15, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacAulay Calum et al. (WO 97/43732) in view of Reiser et al. (U.S. 6,125,339), and further in view of Berliner (2002/0001402) and further in view of Roth (2003/0041053).

Regarding claims 8, MacAulay, Rieser, and Berliner disclose all the claim limitations of the previous claims except the detail claim limitation of claim 8. However, Roth discloses using a remotely located database by disclosing a publicly accessible, remotely located biological database (Fig 6; page 7, paragraph [0087]) over a network (page 8, paragraph [0090]).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Reiser's method, Berliner's method, and Roth's method in MacAulay's system for automatically detecting malignancy-associated changes. The motivation would have been to improve design and method of searching

and retrieving information of a multitude of relational databases (page 2, paragraph [0019]).

Regarding claims 15 and 19, Roth further discloses using a remotely located database by disclosing a publicly accessible, remotely located biological database (Fig 6; page 7, paragraph [0087]) over a network (page 8, paragraph [0090]).

15. Claims 11 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacAulay Calum et al. (WO 97/43732) in view of Reiser et al. (U.S. 6,125,339), and further in view of Berliner (2002/0001402) and further in view of Wang (2001/0051004).

Regarding claims 11, MacAulay, Rieser, and Berliner disclose all the claim limitations of the previous claim except the detail claim limitation of claim 11. However, Wang discloses an image descriptor (page 1, paragraph [0008]).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Reiser's method, Berliner's method, and Wang's method in MacAulay's system for automatically detecting malignancy-associated changes. The motivation would have been to provide an optimal accurate image comparison technique, which can generate and utilize image data as suggested by Wang (page 1, paragraphs [0006]-[0007]).

Regarding claim 23, claim 23 corresponds to claim 11. See explanation of claim 11.

16. Claims 12-14 and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacAulay Calum et al. (WO 97/43732) in view of Reiser et al. (U.S. 6,125,339), and further in view of Wang (2001/0051004), Berliner (2002/0001402), and Lee (2003/0072470).

Regarding claim 12, MacAulay, Rieser, Berliner, and Wang disclose all the claim limitations of the previous claim except the detail claim limitation of claim 12. However, Lee discloses a morphological filter, which exaggerates the features of identified target by the terms of erosion and dilation (Fig 4, page 4, paragraph [0047]) including attenuate and darkening the target (Fig 5A-5B; page 4, paragraph [0047]). Lee also discloses the features of displaying a morphed image and a morphological operator that can identify the target (page 1, paragraph [0008]).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Reiser's method, Berliner's method, Wang's method, and Lee's method in MacAulay's system for automatically detecting malignancy-associated changes. The motivation would have been to make it possible to detect spatial discontinuities and utilizing various data as suggested by Lee (page 1, paragraph [0009]).

Regarding claim 13, Lee further discloses morphological filter, which exaggerates the features of identified target by the terms of erosion and dilation (Fig 4, page 4, paragraph [0047]) including attenuate and darkening the target (Fig 5A-5B; page 4, paragraph [0047]).

Regarding claim 14, Lee further discloses the features of displaying a morphed image and a morphological operator that can identify the target (page 1, paragraph [0008]) and Berliner further discloses a profile of the particulate components being analyzed manually by a physician or a trained technician in order to evaluate the probability of the existence of an inflammatory reaction in the sample (page 9, paragraph [0143]).

17. Claims 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacAulay Calum et al. (WO 97/43732) in view of Reiser et al. (U.S. 6,125,339), and further in view of Berliner (2002/0001402) and further in view of Lee (2003/0072470).

Regarding claim 28, MacAulay, Rieser, Berliner disclose all the claim limitations of the previous claim except the detail claim limitation of claim 28. However, Lee discloses a morphological filter, which exaggerates the features of identified target by the terms of erosion and dilation (Fig 4, page 4, paragraph [0047]) including attenuate and darkening the target (Fig 5A-5B; page 4, paragraph [0047]).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Reiser's method, Berliner's method, and Lee's method in MacAulay's system for automatically detecting malignancy-associated changes. The motivation would have been to make it possible to detect spatial discontinuities and utilizing various data as suggested by Lee (page 1, paragraph [0009]).

Regarding claim 29, Lee further discloses morphological filter, which exaggerates the features of identified target by the terms of erosion and dilation (Fig 4, page 4, paragraph [0047]) including attenuate and darkening the target (Fig 5A-5B; page 4, paragraph [0047]).

Conclusion

18. No claims are allowed.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Wahnkyo Lee whose telephone number is (571) 272-9554. The examiner can normally be reached on Monday - Friday (Alt.) 7:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

John W. Lee
(Art Unit 2624)

JINGGE WU
SUPERVISORY PATENT EXAMINER